FACT SHEET FOR NPDES PERMIT WA-0001317

TECK COMINCO AMERICAN INCORPORATED

INTRODUCTION

The Federal Clean Water Act (FCWA, 1972, and later modifications, 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System of permits (NPDES permits), which is administered by the Environmental Protection Agency (EPA). The EPA has authorized the State of Washington to administer the NPDES permit program. Chapter 90.48 RCW defines the Department of Ecology's authority and obligations in administering the wastewater discharge permit program.

The regulations adopted by the State include procedures for issuing permits (Chapter 173-220 WAC), water quality criteria for surface and ground waters (Chapters 173-201A and 200 WAC), and sediment management standards (Chapter 173-204 WAC). These regulations require that a permit be issued before discharge of wastewater to waters of the state is allowed. The regulations also establish the basis for effluent limitations and other requirements which are to be included in the permit. One of the requirements (WAC 173-220-060) for issuing a permit under the NPDES permit program is the preparation of a draft permit and an accompanying fact sheet. Public notice of the availability of the draft permit is required at least thirty days before the permit is issued (WAC 173-220-050). The fact sheet and draft permit are available for review (see Appendix A--Public Involvement of the fact sheet for more detail on the Public Notice procedures).

The fact sheet and draft permit have been reviewed by the Permittee. Errors and omissions identified in this review have been corrected before going to public notice. After the public comment period has closed, the Department will summarize the substantive comments and the response to each comment. The summary and response to comments will become part of the file on the permit and parties submitting comments will receive a copy of the Department's response. The fact sheet will not be revised. Comments and the resultant changes to the permit will be summarized in Appendix D--Response to Comments.

GENERAL INFORMATION	
Applicant	Teck Cominco American Incorporated
Facility Name and Address	Pend Oreille Mine 1382 Pend Oreille Mine Road; P.O. Box 7 Metaline Falls, WA 99153
Type of Facility:	Lead and Zinc Mining and Milling
SIC Code	1031
Discharge Location	Mine Water Discharge: Pend Oreille River Latitude: 48° 53' 25" N Longitude: 117° 21' 30" W. Mill Tailings Discharge: approximately 84 acres within Section 15, Township 39 N., Range 43 E., W.M., Pend Oreille County
Water Body ID Number	WA 62-1010

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BACKGROUND INFORMATION

DESCRIPTION OF THE FACILITY

HISTORY

The Pend Oreille Mine is an underground lead and zinc mine with surface ore processing and tailings disposal facilities located about 2 miles north of Metaline Falls (Figure 1). The facility was last active in 1977, and Teck Cominco plans to resume mining and milling at the site in early 2004. Construction associated with the reopening of the operations included a lined tailings disposal facility, two ventilation shafts, additional roads, tailings slurry and reclaim water lines, mill water line, an addition to the existing mill building, and a water storage tank (Figure 2).

The mine was in operation from 1952 until 1977, with intermittent periods of inactivity. During operation, tailings from the mill process were deposited in three areas (Figure 2). The Bunker Hill Company owned the mine at the time of closure in 1977. Between 1977 and 1986, Bunker Hill Company, Pintlar, and GRC Exploration continued exploration in the area and operated pumps to prevent flooding of the mine by ground water. The mine was allowed to flood between 1986 and 1988.

In 1988, Resource Finance Corporation (RFC) obtained an option to purchase the property from Pintlar. RFC dewatered the mine and completed a feasibility study for mining and milling. In 1990, RFC purchased the mine and mill, and 13,000 acres of minerals holdings in the district.

In 1992, RFC initiated the environmental review process for reopening the mine and milling facilities. Engineering reports, permit applications, and associated documents were submitted to the Department in order to obtain the necessary permits and approvals for the project. However, in 1994, RFC abandoned permitting for the proposed operations. Cominco purchased the Pend Oreille Mine in 1995. In 1998, Cominco initiated the environmental review and permitting process for reopening the mine and milling site.

Ongoing dewatering of the mine has been regulated by an NPDES permit originally issued to Bunker Hill Mining Company in 1977. The permit expired in 1981, and has been administratively extended (permit terms and conditions remained in effect) since that time.

INDUSTRIAL PROCESS

Lead and zinc bearing ores would be extracted underground, then transported to the surface via a lift and conveyor system. Lead and zinc concentrates would then be recovered in the milling process. The concentrates would be trucked to the Teck Cominco smelter in Trail, British Columbia for further refining. Process wastewater and solids (tailings) from the milling process will be discharged to the lined tailings disposal facility (operated as a zero discharge impoundment). Mine water from the underground workings will continue to be discharged to the Pend Oreille River. Process water will be supplied via a combination of underground mine water and water reclaimed from the tailings impoundment.

The ore body is located in the Yellowhead horizon, some 1,550 to 2,400 feet below ground surface (bgs). Mining will occur with an irregular room and pillar layout, with ore removed in a honeycombed network of rooms up to 30 feet in width and 43 feet in height. Rock left behind between the rooms will serve as pillars that provide roof support. An estimated 2,200 tons of ore would be processed per day for a total of ten years. Over the life of the mine, 6.1 million tons of ore would be recovered and 689,000 tons of waste rock would be produced. Most of the waste rock would be back stowed into mined out workings.

The mine will be developed by drilling, blasting, removal, and transporting waste rock and ore. The ore will be hoisted via an internal shaft to an underground crusher. The ore will be crushed to a maximum diameter of 2 inches, then will be carried to the surface by a conveyor belt.

At the surface, the crushed ore will be stored in two 1,000 ton capacity coarse ore bins. Ore from the coarse bins will be fed to a tertiary crushing and screening plant reducing the material to a 5/8 inch minus product. The fine ore will be stored in one of three 1,000 ton fine ore bins prior to milling.

The milling process begins with grinding the fine ore in one of three, 10 foot diameter by 8 foot long, steel ball mills with three rake classifiers. After grinding, the material is fed to a flotation circuit where lead, then zinc will be removed from the ore by flotation. The overflow from the flotation cells are concentrated, thickened and filter pressed. This results in the lead and zinc concentrates at a moisture content of about 12 percent. These concentrates are stored prior to shipment offsite for further processing at the Teck Cominco smelter at Trail, B.C.

Chemicals used in the milling process include the following: sodium cyanide (used as a depressant for pyrite in the zinc circuit; xanthates (used in the flotation process); lime (used to adjust pH; copper sulfate (used to enhance the differential flotation of lead and zinc); and methyl isobutyl carbinol (used to stabilize the froth). The process is operated at a pH of between 9 and 11.

TAILINGS DISPOSAL

The material remaining after the lead and zinc removal (tailings) is pumped to a lined impoundment. The tailings disposal facility is an 84 acre surface impoundment with an engineered double liner system located on top of tailings area #3 (Figure 2). The liner system includes an over drainage collection system on top of the upper (primary) liner. This will serve to reduce hydrostatic head on the primary layer (if needed), and to dewater the tailings. A leak detection layer is located between the primary and secondary liners.

In the TDF, the tailings solids will be allowed to settle. Water will be withdrawn from the surface and be reused in milling operations.

MINE WATER DISCHARGE

The underground mine workings require dewatering. These waters are collected from multiple points underground. During typical dewatering, the collected mine water is pumped to the A4 sump. The A4 sump is located at about the 900 foot level of the mine, and consists of a network of abandoned tunnels with an estimated volume of 25 million gallons. This sump serves as a settling basin for suspended solids in the mine water.

From the A4 sump, the water is then pumped to the 1700 sump (at the 1700 foot level on the mine). The 1700 sump is a concrete settling basin with several baffled sections providing additional suspend solids removal. Water from the 1700 sump is pumped directly to the surface and is discharged to the Pend Oreille River.

The Permittee has also studied the use of sulfate reducing bacteria to precipitate metals in the mine water discharge. In 2002, a small scale pilot system was installed and operated within the mine. This system consisted of pumping the mine water through a series of packed columns. The columns were inoculated with a natural strain of sulfate reducing bacteria taken from the mine workings. Ethanol was also added to the columns as a food/carbon source for the bacteria. The pilot system provided good reduction of sulfate and heavy metals.

In June of 2003, ethanol addition was initiated at a full scale trial within the mine. Ethanol is added directly to the mine water prior to discharge into the 25 million gallon A4 sump. The reactions will take place in situ (the sump itself will serve as the bioreactor for the sulfate reducing bacteria). Results from this trail are not yet available.

DISCHARGE OUTFALL

The treated mine water is discharged to the Pend Oreille River at River Mile 25. The discharge point is located about 20 feet above the River surface, at an angle of 35 to 45 angle from vertical (Figure 3). The discharge enters the water near the river bank. The discharge is not continuous. During typical operation, a discharge cycle consists of 15 minutes pumping at about 1,500 gpm, followed by 15 minutes of no discharge. Average daily discharge is about 350 gpm (500,000 gallons per day).

GROUND WATER

The regional hydrogeology of the Metaline Falls area is determined mainly by precipitation in the highland areas to the east and west of the Pend Oreille River, and by the river itself which acts as a ground water sink. Snowmelt and rainfall infiltrate into the Paleozoic rocks and glacial sediments and eventually surface as seeps, springs, streams, and rivers. The upper ground water table is mostly unconfined and can be found in both the Paleozoic bedrock and the glacial sediments. Water may move from one hydrogeologic unit to another depending on the depth or erosion in the bedrock and the thickness of the glacial sediments (ENSR, 2003).

There are seven monitoring wells in the vicinity of the tailings disposal facility (Figure 4). These wells were installed in the glaciofluvial sediments to monitor potential impacts from the tailings impoundment. Monitoring well MW-1 was installed as a piezometer and is not routinely sampled for chemical analyses.

At the tailings site, ground water flows from south to north beneath the impoundment, then northwest toward the Pend Oreille River. The change in ground water flow to the northwest occurs north of Frog Creek in the area between MW-2 and MW-5. Ground water occurs within the glacial alluvial sediments, but can also be found at the interface between bedrock and the glacial alluvium.

A kettle basin lies beneath the tailings area #3, created when continental glaciers advanced over northeastern Washington during the Quaternary Period. Glacial sediments fill this kettle basin.

Due to the irregular topography of the bedrock surface, the saturated thickness of the aquifer varies considerably. Frog Creek is fed by springs that occur where ground water in the kettle basin glacial sediments are exposed at the surface.

Ground water quality as measured by upgradient wells MW-2, MW-3, and MW-01-4 meets ground water quality criteria. Total dissolved solids (TDS) range from 121 to 340 mg/L with sulfate concentrations below 66 mg/L. Metals concentrations are also below ground water quality criteria.

Ground water quality measured by MW-5 shows a definite impact from the past disposal of tailings. TDS and sulfate exceed ground water quality criteria (maximum measured concentrations of 1,380 and 690 mg/L, respectively). The extent of this contamination is limited, as wells MW-6 and MW-7 sulfate concentrations have not exceeded 110 and 75 mg/L, respectively. Elevated sulfate does not travel in ground water below Frog Creek, as most ground water surfaces as springs that feed the creek.

SURFACE WATER

Surface water in the vicinity of the Pend Oreille Mine include the Pend Oreille River, creeks that transect the mineralized areas of the Metaline District and feed into the river, and lakes and wetlands that are usually found within the glacial sediments. At the point of discharge, the Pend Oreille River is about 690 feet wide.

The site is located within the Metaline Falls watershed which is 11,585 acres in size and is primarily drained by Threemile Creek. Elevations within the watershed range from 1,990 feet at the Pend Oreille River to 6,830 feet in the highest mountains. Threemile Creek flows year-round and eventually drains into the Pend Oreille River (Figure 5). Threemile Creek is located near the northern border of the mine project area.

Other creeks in the mine project area include Frog Creek, and Creeks #1, #2, and #3. Creek #1 originates near the Metaline Falls golf course adjacent to the mine property. This creek flows in a well defined channel to the Pend Oreille River. Creek #2 starts at the north end of tailings disposal area #1 and flows toward the Pend Oreille River. Frog Creek starts at the down slope of tailings area #3 as a ground water spring and flows in multiple channels toward the Pend Oreille River.

The Permittee monitors a total of five sites to assess the impacts from its operations to surface water quality (Figure 5). These include two sites on the Pend Oreille River, one between Sullivan Creek and Flume Creek, upstream of the operations (sample location 02) and one downstream above Three Mile Creek (sample location 07). There are also two sites on Frog Creek, one by the portal of the mine (sample locations 10) and the other at the confluence of the Pend Oreille River (sample location 05). The last station is Creek #2 which originates as seepage from tailings area #1 (sample location 06).

PERMIT STATUS

The previous permit placed effluent limitations on mine drainage from the active area of mining for flow, TSS, lead, zinc, copper, mercury, and pH. The permit also placed limitations on discharges from mine drainage from inactive areas to Flume Creek, a surface discharge from old

tailings areas #1 and #2 to the Pend Oreille River, and discharge from tailings area #3 to the Pend Oreille River.

An NPDES application for permit renewal for the discharge of mine drainage to the Pend Oreille River was submitted to the Department on January 15, 1999 and accepted by the Department on January 28, 1999. A State Waste Discharge (SWD) Permit application for the discharge of process wastewater to the tailings impoundment was submitted to the Department on June 24, 2003 and accepted by the Department on July 21, 2003.

SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT

The facility last received an NPDES compliance inspection on September 30, 2002. Numerous inspections were also conducted by the Department during construction of the tailings disposal facility.

During the history of the previous permit, the Permittee has remained in compliance based on Discharge Monitoring Reports (DMRs) submitted to the Department and inspections conducted by the Department.

WASTEWATER CHARACTERIZATION

Table 1 summarizes effluent data from January, 2001 to August, 2003. Effluent flow during this time averaged 0.56 million gallons per day (mgd). Trace levels of metals and sulfates are present in the mine water. These levels are likely the result of the ground water contact with the mineralized areas of the mine. Concentrations of radium and uranium originate mostly from the older workings (in the Josephine Horizon), and again, are thought to be present due to contact with rocks that have natural concentrations of radioactive elements.

Additional effluent data (for conventional parameters and priority pollutants) has been collected as part of testing required by the permit application (Table 1). Concentrations of volatile and semi-volatile organics, and pesticide/PCBs were below detection limits. Levels of total arsenic and nickel in the discharge were measured at 4 and 6 µg/L, respectively.

SEPA COMPLIANCE

The Department prepared an environmental impact statement (EIS) for the reopening of the mine and milling facilities (Ecology, 2000).

PROPOSED PERMIT LIMITATIONS

Federal and State regulations require that effluent limitations set forth in a NPDES permit must be either technology- or water quality-based. Technology-based limitations are based upon the treatment methods available to treat specific pollutants. Technology-based limitations are set by regulation or developed on a case-by-case basis (40 CFR 125.3, and Chapter 173-220 WAC). Water quality-based limitations are based upon compliance with the Surface Water Quality Standards (Chapter 173-201A WAC), Ground Water Standards (Chapter 173-200 WAC), Sediment Quality Standards (Chapter 173-204 WAC) or the National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992). The more stringent of these two

limits must be chosen for each of the parameters of concern. Each of these types of limits is described in more detail below.

The limits in this permit are based in part on information received in the application. The effluent constituents in the application were evaluated on a technology- and water quality-basis. The limits necessary to meet the rules and regulations of the State of Washington were determined and included in this permit. Ecology does not develop effluent limits for all pollutants that may be reported on the application as present in the effluent**.** Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, and do not have a reasonable potential to cause a water quality violation**.** Effluent limits are not always developed for pollutants that may be in the discharge but not reported as present in the application. In those circumstances the permit does not authorize discharge of the non-reported pollutants. Effluent discharge conditions may change from the conditions reported in the permit application. If significant changes occur in any constituent, as described in 40 CFR 122.42(a), the Permittee is required to notify the Department of Ecology. The Permittee may be in violation of the permit until the permit is modified to reflect additional discharge of pollutants.

TECHNOLOGY-BASED EFFLUENT LIMITATIONS

The technology-based limitations for mine drainage and process wastewater are based on New Source Performance Standards (NSPS) developed by the Environmental Protection Agency (EPA). These limitations are found in "Effluent Guidelines and Standards" in the Code of Federal Regulations (CFR), current as of September 9, 2003, as follows:

Subcategory	Technology
Copper, Lead, Zinc, Gold, Silver, and Molybdenum Ores Subcategory (40 CFR 440, Subpart J)	NSPS for mine drainage from mines that produce copper, lead, zinc, gold, silver, or molybdenum bearing ores or any combination of these ores from open-pit or underground operations other than placer deposits -- 40 CFR 440.104(a). NSPS for discharge of process wastewater to navigable waters from mills that use the froth-flotation process alone, or in conjunction with other processes, for the beneficiation of copper, lead, zinc, gold, silver, or molybdenum ores or any combination of these ores -- 40 CFR 440.104(b).

Regulated pollutants for mine drainage include copper, zinc, lead, mercury, cadmium, pH, and total suspended solids (TSS) as follows:

	Effluent Limitations	
Effluent characteristic	Maximum for any 1 day	Average daily values for 30 consecutive days
Copper, mg/L	0.30	0.15
Zinc, mg/L	1.5	0.75
Lead, mg/L	0.6	0.3

Effluent characteristic	Effluent Limitations	
	Maximum for any 1 day	Average daily values for 30 consecutive days
Mercury, mg/L	0.002	0.001
Cadmium, mg/L	0.10	0.05
pH, s.u.	Within the range 6.0 to 9.0	
TSS, mg/L	30	20

For process wastewater, 40 CFR 440.104(b)(1) specifies there shall be no discharge of process wastewater to navigable waters from mills that use the froth-flotation process alone, or in conjunction with other processes, for the beneficiation of copper, lead, zinc, gold, silver, or molybdenum ores or any combination of these ores.

However, 440 CFR 440.104(b)(2) allows two exceptions to the 'no discharge' requirement. The first is when the annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility exceeds the annual evaporation. In this case, a volume of water equal to the difference between the annual precipitation and the annual evaporation may be discharged subject to the above effluent numeric limitations. For the Metaline Falls vicinity, mean annual precipitation is 30 inches while estimated evaporation is about 20.2 inches per year.

The second exemption is when there is a build up of contaminates in the recycle water which significantly interferes with the ore recovery process and this interference cannot be eliminated through treatment of the recycle water. The federal effluent guidelines allow a discharge of process wastewater in an amount necessary to correct the interference after installation of appropriate treatment. Any discharge is also subject to the above numeric effluent limitations.

The tailings disposal facility was designed to contain the process water and have no discharge to either surface or ground waters of the State. Further, the Metals Mining and Milling Act states that tailings facilities are to be designed and operated to prevent release of pollution [Chapter 78.56.100 1(a)]. Therefore, the proposed permit will not allow discharge of process wastewater to either surface or ground waters of the State.

Effluent monitoring has shown detectable concentrations of oil and grease in the effluent (up to 21 mg/L). Based on best professional judgment, the proposed permit sets an effluent limitation for oil and grease at 10 mg/L (monthly average) and 15 mg/L (daily maximum). These values are taken from the Department's guidelines for dischargers containing oil and grease of mineral origin (Ecology, 1987). Since the effluent cannot initially meet this limitation, a compliance schedule will be proposed to allow time for the Permittee to examine alternatives for meeting this limitation. The proposed permit also sets an interim so there is no additional loading to the receiving water. Based on best professional judgment, these interim limits were set at 20 mg/L (monthly average) and 30 mg/L (daily maximum).

SURFACE WATER QUALITY-BASED EFFLUENT LIMITATIONS

In order to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters, WAC 173-201A-060 states that waste discharge permits shall be conditioned such that the discharge will meet established Surface Water Quality Standards. The Washington State Surface Water Quality Standards (Chapter 173-201A WAC) is a state regulation designed to protect the beneficial uses of the surface waters of the state. Surface water quality-based effluent limitations may be based on an individual waste load allocation (WLA) or on a WLA developed during a basin wide total maximum daily loading study (TMDL).

On July 1, 2003, the State adopted amended Surface Water Quality Standards. However, these amended standards have not yet been approved by the Environmental Protection Agency (EPA) and hence cannot be used for any Federal related permit decisions. Therefore, the 1997 version of the Surface Water Quality Standards were used in this proposed permit.

NUMERICAL CRITERIA FOR THE PROTECTION OF AQUATIC LIFE

"Numerical" water quality criteria are numerical values set forth in the State of Washington's Water Quality Standards for Surface Waters (Chapter 173-201A WAC). They specify the levels of pollutants allowed in a receiving water while remaining protective of aquatic life. Numerical criteria set forth in the Water Quality Standards are used along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used in a permit.

NUMERICAL CRITERIA FOR THE PROTECTION OF HUMAN HEALTH

The U.S. EPA has promulgated 91 numeric water quality criteria for the protection of human health that are applicable to Washington State (EPA 1992). These criteria are designed to protect humans from cancer and other disease and are primarily applicable to fish and shellfish consumption and drinking water from surface waters.

NARRATIVE CRITERIA

In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) limit toxic, radioactive, or deleterious material concentrations below those which have the potential to adversely affect characteristic water uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health. Narrative criteria protect the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) waters in the State of Washington.

ANTIDEGRADATION

The State of Washington's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when the natural conditions of a receiving water are of higher quality than the criteria assigned, the natural conditions shall be

protected. More information on the State Antidegradation Policy can be obtained by referring to WAC 173-201A-070.

Critical Conditions

Surface water quality-based limits are derived for the waterbody's critical condition, which represents the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or characteristic water body uses.

Mixing Zones

The Water Quality Standards allow the Department of Ecology to authorize mixing zones around a point of discharge in establishing surface water quality-based effluent limits. Both "acute" and "chronic" mixing zones may be authorized for pollutants that can have a toxic effect on the aquatic environment near the point of discharge. The concentration of pollutants at the boundary of these mixing zones may not exceed the numerical criteria for that type of zone. Mixing zones can only be authorized for discharges that are receiving all known, available, and reasonable methods of prevention, control and treatment (AKART) and in accordance with other mixing zone requirements of WAC 173-201A-100.

The National Toxics Rule (EPA, 1992) allows the chronic mixing zone to be used to meet human health criteria.

Description of the Receiving Water

The facility discharges to the Pend Oreille River. The river basin drains about 26,000 square miles extending into Montana, Idaho and Washington. The river system originates in Montana as the Clark Fork River. The Clark Fork flows into Lake Pend Oreille in Idaho; and the outflow of the Lake forms the Pend Oreille River. The Pend Oreille flows into Washington at river mile 87.7, runs through the northeast corner of the State, and into Canada at river mile 16.0.

In Washington, the river is slow-moving, and has a relatively flat slope. In the vicinity of the wastewater outfall, river flows are regulated upstream by Box Canyon Dam (river mile 34) and downstream by Boundary Dam. Other nearby point source outfalls include the towns of Metaline and Metaline Falls, both about 1 mile upstream.

The Pend Oreille River is designated as a Class A receiving water in the vicinity of the outfall. Characteristic uses include the following: water supply (domestic, industrial, agricultural); stock watering; fish migration; fish and shellfish rearing, spawning and harvesting; wildlife habitat; primary contact recreation; sport fishing; boating and aesthetic enjoyment; commerce and navigation. Water quality of this class shall meet or exceed the requirements for all or substantially all uses.

Surface Water Quality Criteria

Applicable criteria are defined in Chapter 173-201A WAC for aquatic biota. In addition, U.S. EPA has promulgated human health criteria for toxic pollutants (EPA 1992). Water quality criteria for the Pend Oreille River is summarized below:

Fecal Coliforms	100 organisms/100 mL maximum geometric mean
Dissolved Oxygen	8 mg/L minimum
Temperature	20 degrees Celsius maximum or incremental increases above background
pH	6.5 to 8.5 standard units
Turbidity	less than 5 NTU above background
Toxics	No toxics in toxic amounts (see Appendix C for numeric criteria for toxics of concern for this discharge)

Section 303(d) of the Federal Clean Water Act, requires the State to prepare a list of water bodies that do not meet water quality standards. A total daily maximum load (TMDL) must be developed for each water body listed on the 303(d) list. The purpose of a TMDL is to determine the amount of pollution a water body can receive while meeting water quality standards. Maximum allowable pollution from various sources are established as individual waste load allocations (WLAs).

Portions of the Pend Oreille River are on the 1998 303(d) list for exotic aquatic plants (Eurasian milfoil), pH, and temperature. One of these listed sections includes a one mile stretch centered at the Metaline Falls bridge. This section is about 1.5 miles upstream from the Permittee's discharge point. In developing proposed effluent limitations and requirements, the Department assumed that the river stretch located at the Permittee's discharge point is also impaired (since the listed stretch of impairment is located upstream and in the near vicinity of the discharge).

Based on data from a Department's long term water quality monitoring station for the Pend Oreille River at the Idaho-Washington State line, both temperature and pH routinely exceed criteria during the warmer summer months (July, August and September). For temperature and pH, there is not yet an established TMDL for the Pend Oreille River.

CONSIDERATION OF SURFACE WATER QUALITY-BASED LIMITS FOR NUMERIC CRITERIA

Pollutant concentrations in the proposed discharge exceed water quality criteria with technology-based controls which the Department has determined to be AKART. A mixing zone is authorized in accordance with the geometric configuration, flow restriction, and other restrictions for mixing zones in Chapter 173-201A WAC and are defined as follows:

> *In rivers and streams, mixing zones, singularly or in combination with other mixing zones, shall comply with the most restrictive combination of the following: (i) Not extend in a downstream direction for a distance from the discharge port(s) greater than three hundred feet plus the depth of water over the discharge port(s), or extend upstream for a distance of over one hundred feet; (ii) Not utilize greater than twenty-five percent of the flow; and (iii) Not occupy greater than twenty-five percent of the width of the water body.*

A zone where acute criteria may be exceeded shall comply with the most restrictive combination of the following: (i) Not extend beyond ten percent of the distance towards the upstream and downstream boundaries of an authorized mixing zone, as measured independently from the discharge port(s); (ii) Not utilize greater than two and one-half percent of the flow; and (iii) Not occupy greater than twenty-five percent of the width of the water body.

The dilution factors of effluent to receiving water have been estimated by field study and modeling (Duke Engineering, 1999). The field work consisted of detailed velocity measurements and depth profiles across the river channel. In addition, small drogues were released at the point of effluent discharge and their movements were tracked in the effluent/receiving water plume.

During the study, the river flow of 19,000 cfs was higher than the 7Q10 flow of 4,700 cfs. River velocities at the 7Q10 critical flow were estimated based on the measured values. The CORMIX3 model (version 2.1) was chosen as the most appropriate models for the discharge configuration. A peak effluent flow rate of 1,500 gpm (2.16 mgd) was used. The modeled plume width and travel times were generally confirmed by the observed drogues released at the point of initial discharge.

After the modeling work was completed, the Permittee estimated an additional 500 gpm (0.72 mgd) may be generated from the new underground workings. For the proposed permit, the Department reran the CORMIX 3 model (version 3.2) to determine dilutions with a maximum expected effluent discharge rate of 2,000 gpm (2.88 mgd). River conditions were identical to those used by Duke Engineering. This discharge rate was used to determine dilution factors at the edge of both the acute and chronic mixing zone boundaries.

For intermittent discharges, the Department's guidance for conducting mixing zone analyses (Ecology, 1997) recommends that the modeled dilution factor at the peak effluent flowrate for the acute boundary be adjusted upward by a ratio of maximum flowrate to one-hour, time-averaged flowrate (if the maximum flowrate occurs for less than one hour); and the resultant dilution factor for the chronic boundary be adjusted upward by a ratio of maximum flowrate to four-day, time-averaged flowrate.

These ratios were calculated assuming the discharge cycle occurs every 20 minutes, at a maximum discharge rate of 2,000 gpm. The following were the estimated continuous dilution factors, adjusting ratios, estimated intermittent dilution ratios, and plumes widths at the acute and chronic mixing zone boundaries:

	Acute (30 feet downstream)	**Chronic (300 feet downstream)**
Modeled Dilution Factor @ Continuous Flow	7.0 14.3% effluent	52.1 1.92% effluent
Adjustment Factor	1.5	2.0
Estimated Dilution Factor @ Intermittent Flow	10.5	104.2

	9.5% effluent	0.96% effluent
Width of Effluent Plume	14 ft (4.3 m)	83 ft (25.4 m)

Dilution factors based on percentage of river were also calculated. Using the maximum discharge rate of 2,000 gpm (2.88 mgd) and 25 and 2.5 percent of the 7Q10 river flow for the chronic and acute zones, respectively, the resulting dilutions were as follows:

	Acute (2.5% of 7Q10)	**Chronic (25% of 7Q10)**
Dilution Factor Based on % of River Flow	26.3 3.8% effluent	253.5 0.39% effluent

The flow adjusted modeled dilutions are the most restrictive. Therefore, these will be used to specify mixing zone dilutions in the proposed permit.

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near field) or at a considerable distance from the point of discharge (far field). Toxic pollutants, for example, are near-field pollutants--their adverse effects diminish rapidly with mixing in the receiving water. Thus, the method of calculating surface water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

The derivation of surface water quality-based limits also takes into account the variability of the pollutant concentrations in both the effluent and the receiving water. The critical condition for the Pend Oreille River is the seven day average low river flow with a recurrence interval of ten years (7Q10). Table 2 lists the ambient background data used for this permit. The ambient background data was taken from the Permittee's routine surface water monitoring at station 02 (Pend Oreille River at Flume Creek).

The impacts of metals and other toxics were determined as shown below, using the dilution factors at critical conditions described above.

Toxic Pollutants--Federal regulations (40 CFR 122.44) require NPDES permits to contain effluent limits for toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. This process occurs concurrently with the derivation of technology-based effluent limits. Facilities with technology-based effluent limits defined in regulation are not exempted from meeting the Water Quality Standards for Surface Waters or from having surface water quality-based effluent limits.

Copper, zinc, lead, mercury, and cadmium have technology based effluent limitations as described previously. Water quality based limits for these metals were determined with procedures given in EPA, 1991 (Appendix C) at critical effluent and receiving water conditions. The critical conditions used in the modeling are as follows: acute dilution factor 10.5, chronic dilution factor 104.2, a minimum effluent hardness of 245 mg/L as $CaCO_3$, and receiving water conditions as listed in Table 2.

The results indicate that water quality based limits are more stringent that the technology based limits for copper, zinc, lead, and cadmium. The technology based limits for mercury are more

stringent than the water quality based limit. The more stringent limits will be placed in the proposed permit (Table 3).

Additionally, the following toxics were determined to be present in the discharge: ammonia, cyanide, arsenic, and nickel (Table 1). A reasonable potential analysis (See Appendix C) was conducted on these parameters to determine whether or not effluent limitations would be required in this permit.

Calculations using all applicable data resulted in a determination that there is no reasonable potential for this discharge to cause a violation of water quality standards for ammonia, cyanide, arsenic, and nickel. This determination assumes that the Permittee meets the other effluent limits of this permit.

Water quality criteria for metals in Chapter 173-201A WAC are based on the dissolved fraction of the metal. The Permittee may provide data clearly demonstrating the seasonal partitioning of the dissolved metal in the ambient water in relation to an effluent discharge. Metals criteria may be adjusted on a site-specific basis when data is available clearly demonstrating the seasonal partitioning in the ambient water in relation to an effluent discharge.

Metals criteria may also be adjusted using the water effects ratio approach established by USEPA, as generally guided by the procedures in USEPA Water Quality Standards Handbook, December 1983, as supplemented or replaced.

Temperature — As discussed previously, the Department considers the river as impaired for both temperature and pH at the point of discharge during the months of July, August, and September.

Chapter 173-201A-060(6) states that no permit shall be issued which results in a violation of established water quality criteria, except as allowed by a mixing zone. However, during the time when the receiving water fails to meet standards, there is no dilution available for the effluent to comply with criteria. In this case, only an end-of-pipe effluent limit at the criteria value would ensure compliance with water quality standards.

Chapter 173-201A-160(4) WAC also allows the Department to set a schedule of compliance (not to exceed ten years) for achieving compliance with water quality criteria. Chapter 173-201A-160(4)(b) WAC further states that interim effluent limitations will be established for the period of time during which compliance with water quality criteria is deferred.

The Department has also developed guidance for permitting discharges to 303(d) listed waterbodies (Section 3.3.11 of Permit Writer's Manual). Where the water quality impairment is confirmed or verified, the following is required (decision box 2, page VI-37): an engineering report examining options and costs; an interim limit so there is no additional loading to the receiving water; and a final effluent limit at the water quality criteria (or no discharge during the critical period).

Based on the guidance, the proposed permit requires the preparation of an Effluent Temperature Control Study (Special Condition S11). This report requires the Permittee to examine alternatives for reducing effluent temperatures with the goal of meeting the water quality standard for temperature at the end-of-pipe. This report will be required to be submitted within three years from the effective date of this permit.

The proposed permit also set interim temperature limits to assure there is no additional loading to the receiving water. These interim temperature limits will apply only during the time when receiving water exceeds the criteria (July through September). These limits are based on existing effluent temperature; and were set as follows: a daily maximum limit and a monthly average limits were based on the 99th and 95th percentile of the effluent temperature data. The data set used was the daily temperatures from January, 2001 to August, 2003 (see Table 4).

The 99th and 95th percentile of the data were calculated adding three and two standard deviations, respectively, to the mean (Table 4). The resulting proposed interim temperature limits are a daily maximum of 72.2 ºF and a monthly average of 70.6 ºF.

Finally, the guidance recommends that the final temperature limit is not placed in the permit, but rather discussed in the fact sheet. Therefore, the compliance date for meeting an end-of-pipe, water quality based limit for temperature (in the absence of a completed temperature total daily maximum load (TMDL) for the Pend Oreille River) is proposed to be 10 years from the effective date of this permit. This limit may also be modified based on either a change in the 303(d) temperature listing for the Pend Oreille River; and/or a change in the applicable water quality standard for temperature for the Pend Oreille River, and/or results from the Permittee's effluent temperature control study.

During the remainder of the year (October to June) when the Pend Oreille River meets receiving water temperature criteria, there is no reasonable potential of a standards violation (temperature increase at the chronic mixing zone boundary is within 0.3ºC). Therefore, the proposed permit does not contain an effluent limit for temperature during this time period.

For pH, the proposed permit contains a maximum pH limit of 8.5 s.u. (the upper limit of the water quality criteria). However, unlike temperature, the facility routinely meets this limitation. Therefore, the proposed permit does not contain a compliance schedule or any other additional requirement for meeting this pH limitation.

WHOLE EFFLUENT TOXICITY

The Water Quality Standards for Surface Waters require that the effluent not cause toxic effects in the receiving waters. Many toxic pollutants cannot be detected by commonly available detection methods. However, toxicity can be measured directly by exposing living organisms to the wastewater in laboratory tests and measuring the response of the organisms. Toxicity tests measure the aggregate toxicity of the whole effluent, and therefore this approach is called whole effluent toxicity (WET) testing. Some WET tests measure acute toxicity and other WET tests measure chronic toxicity.

Acute toxicity tests measure mortality as the significant response to the toxicity of the effluent. Dischargers who monitor their wastewater with acute toxicity tests are providing an indication of the potential lethal effect of the effluent to organisms in the receiving environment.

Chronic toxicity tests measure various sublethal toxic responses such as retarded growth or reduced reproduction. Chronic toxicity tests often involve either a complete life cycle test of an organism with an extremely short life cycle or a partial life cycle test on a critical stage of one of a test organism's life cycles. Organism survival is also measured in some chronic toxicity tests.

Accredited WET testing laboratories have the proper WET testing protocols, data requirements, and reporting format. Accredited laboratories are knowledgeable about WET testing and capable of calculating an NOEC, LC_{50}, EC_{50}, IC_{25}, etc. All accredited labs have been provided the most recent version of the Department of Ecology Publication # WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* which is referenced in the permit. Any Permittee interested in receiving a copy of this publication may call the Ecology Publications Distribution Center 360-407-7472 for a copy. Ecology recommends that Permittees send a copy of the acute or chronic toxicity sections(s) of their permits to their laboratory of choice.

An effluent characterization for acute and chronic toxicity was conducted in 1994 during Resource Finance's permitting process to reopen the operations. However, the proposed permit requires a re-characterization for effluent toxicity using the most recent EPA methodology and species.

HUMAN HEALTH

Washington's water quality standards now include 91 numeric health-based criteria that must be considered in NPDES permits. These criteria were promulgated for the state by the U.S. EPA in its National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992).

The Department has determined that the effluent is likely to have chemicals of concern for human health for the following parameters (Table 1): arsenic, cyanide, mercury, radium, and uranium.

A determination of the discharge's potential to cause an exceedance of the water quality standards was conducted as required by 40 CFR 122.44(d). The reasonable potential determination was evaluated with procedures given in the Technical Support Document for Water Quality-Based Toxics Control (EPA/505/2-90-001) and the Department's Permit Writer's Manual (Ecology Publication 92-109, July, 1994).

The Department's Permit Writer's manual recommends the use of dilution factors at the chronic mixing zone boundary for human health reasonable potential determinations. The design receiving water flows are the 30Q5 and the harmonic mean flow for non carcinogens and carcinogens, respectively. However, the Department does not have receiving water flow velocities at these two respective river flows. Therefore, the human health reasonable potential determination used the modeled chronic dilution factor at the 7Q10 river flow as discussed previously. This dilution factor should be more restrictive than those calculated using higher river flows and lower effluent discharge rates.

The determination indicated that the discharger has a reasonable potential to cause a violation of water quality standards for arsenic. However, the Department will not include a human health based arsenic limit in the proposed permit because of the uncertainty of the freshwater human health criteria for arsenic.

In 1992, the USEPA adopted risk-based arsenic criteria for the protection of human health for the State of Washington. The freshwater criterion is 0.018 µg/L, and is based on exposure from fish and shellfish tissue and water ingestion. This criterion is controversial because it differs from the drinking water maximum contaminant level (MCL) of 10 µg/L. Further, the human health

criteria are sometimes exceeded by natural background concentrations of arsenic in surface water and ground water.

At this time, the proposed permit will require routine monitoring of both effluent and receiving waters for arsenic. This data will then be available for permit decisions when the regulatory issues with the human health based arsenic criteria are resolved.

SEDIMENT QUALITY

The Department has promulgated aquatic sediment standards (Chapter 173-204 WAC) to protect aquatic biota and human health. These standards state that the Department may require Permittees to evaluate the potential for the discharge to cause a violation of applicable standards (WAC 173-204-400).

The Department has been unable to determine at this time the potential for this discharge to cause a violation of sediment quality standards. If the Department determines in the future that there is a potential for violation of the Sediment Quality Standards, an order will be issued to require the Permittee to demonstrate that either the point of discharge is not an area of deposition or, if the point of discharge is a depositional area, that there is not an accumulation of toxics in the sediments.

GROUND WATER QUALITY LIMITATIONS

The Department has promulgated Ground Water Quality Standards (Chapter 173-200 WAC) to protect beneficial uses of ground water. Permits issued by the Department shall be conditioned in such a manner so as not to allow violations of those standards (WAC 173-200-100).

The Department believes the Permittee's tailings disposal facility may have the potential to cause a violation of the Ground Water Quality Standards. The proposed permit requires ground water monitoring and analyses as outlined in the Department's Conditional Exemption (as described below).

METALS MINING AND MILLING ACT REQUIREMENTS

The Metals Mining and Milling Act (Chapter 78.56 RCW) assures that metals mineral mining or milling operations are designed, constructed, and operated in a manner that promotes both economic opportunities and environmental and public health safeguards for the citizens of the State. The proposed permit includes a number of operational requirements contained in Chapter 78.56 RCW.

WASTE ROCK MANAGEMENT PLAN

Sulfide minerals encountered during mining may chemically react when exposed to air and moisture (termed 'acid mine drainage'). Acid mine drainage occurs when mineral pyrite is oxidized to form sulfuric acid and iron hydroxide according to the following equation:

$$FeS_2 + 3.75\ O_2 + 3.5\ H_2O \rightarrow Fe(OH)_3 + 2\ H_2SO_4$$

The sulfuric acid generated may be neutralized with other minerals present (like calcium carbonate). In this case, additional dissolved solids (e.g. sulfates, carbonates, etc.) may be

released to local surface and ground waters. However, when there is not enough neutralizing material available, a lowering of pH in local surface and groundwater may occur. Additionally, at low pHs, metals dissolve more readily and may be discharged to the environment.

Because of the potential of reactive waste materials, Chapter 78.56.100(1)(b) requires the Permittee to develop a waste rock management plan approved by the Departments of Ecology and Natural Resources which emphasizes pollution prevention. The Permittee has submitted a waste rock management plan in March, 2003. The plan was approved by both Departments in April, 2003.

Waste rock developed during mining will remain underground. The Permittee plans to backfill inactive areas/stopes with the waste material. An ongoing monitoring program will be conducted to identify potentially acid generating material. These materials will be placed in dry areas/stopes of the mine. Additionally, the areas will be monitored on a ongoing basis to detect any acid mine drainage from these areas.

The proposed permit requires an annual summary of the waste rock management efforts to be reported to the Department.

RECLAMATION BONDING

Before any necessary permits are issued for metals mining and milling operations, the applicant must deposit with the Department a performance security for reclamation, post closure monitoring, and for cleanup of potential problems revealed during or after closure (RCW 78.56.110).

The Permittee has submitted a closure plan for reclamation of the tailings facility. This plan calls for capping the impoundment with an liner system including an impermeable liner, a drainage system, and a vegetative cover. The plan also includes treatment system for any leachate recovered from the tailings leak detection system. The Permittee has estimated costs associated with closure of the impoundment, post closure monitoring, and reclamation and remediation of other areas of the site. These costs amount to $7,882,000.

Prior to issuance of the proposed permit, the Permittee must provide a reclamation bond (or some other acceptable performance security) for this amount. Additionally, the proposed permit will require that this bond be maintained through the life of the permit.

REQUIREMENTS FROM CONDITIONAL EXEMPTION FROM STATE DANGEROUS WASTE REGULATIONS

The mill tailings will contain elevated concentrations of zinc, lead, arsenic and cadmium. The tailings solids failed the toxicity designation for lead using the Toxicity Characteristic Leaching Procedure (TCLP) test. The Permittee applied to the Department for exemption of the mine tailing waste from certain provisions in Chapter 173-303, WAC, Dangerous Waste Regulations. On July 12, 2002, the Department granted this exemption, provided certain conditions were met. The following requirements from this Conditional Exemption are included in the proposed permit.

ACTION LEAKAGE RATE

The action leakage rate is the maximum design flow rate that the leak collection and recovery system (LCRS) can remove without the fluid head on the bottom liner exceeding one (1) foot. For this facility, the Department approved an action leakage rate from the LCRS of 25 gallons per minute. Additionally, there are two trigger level leakage rates (5 and 15 gpm). The proposed permit contains requirements that these leakage rates are met; and that requirements of the Permittee's Emergency Action Plan for LCRS Leakage be followed if these leakage rate are exceeded.

GROUND WATER MONITORING

The Conditional exemption also requires a ground water monitoring sampling and analyses plan (GWSAP). The Department must approve the GWSAP at least 60 day prior to initiation of operations. A draft plan has been submitted for Department review.

The proposed permit requires the monitoring results be submitted to the Department on a quarterly basis. Additionally, a Tailings Disposal Facility Annual Report will be required that summarizes operations at the tailings impoundment, including ground water data analyses as required by the GWSAP.

MONITORING REQUIREMENTS

Monitoring, recording, and reporting are required (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and the effluent limitations are being achieved.

The monitoring schedule is detailed in the proposed permit under Condition S.2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring.

LAB ACCREDITATION

With the exception of certain parameters the permit requires all monitoring data to be prepared by a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, *Accreditation of Environmental Laboratories.*

OTHER PERMIT CONDITIONS

REPORTING AND RECORDKEEPING

The conditions of S3. are based on the authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 173-220-210).

NON-ROUTINE AND UNANTICIPATED DISCHARGES

Occasionally, this facility may generate wastewater which is not characterized in their permit application because it is not a routine discharge and was not anticipated at the time of application. These typically are waters used to pressure test storage tanks or fire water systems

or leaks from drinking water systems. These are typically clean waste waters but may be contaminated with pollutants. The permit contains requirements for discharging non-routine and unanticipated wastewater to surface waters of the State. The permit requires a characterization of these waters for pollutants and examination of the opportunities for reuse. Depending on these results, Ecology may authorize the direct discharge through the mine water discharge outfall or a stormwater outfall.

SPILL PLAN

The Department has determined that the Permittee stores and uses a quantity of chemicals that have the potential to cause water pollution if accidentally released. The Department has the authority to require the Permittee to develop best management plans to prevent this accidental release under section 402(a)(1) of the Federal Water Pollution Control Act (FWPCA) and RCW 90.48.080.

The Permittee has developed a plan for preventing the accidental release of pollutants to state waters and for minimizing damages if such a spill occurs. The proposed permit requires the Permittee to update this plan (also including the best management practices used for handling and using blasting materials at the mine) and submit it to the Department.

SOLID WASTE PLAN

The Department has determined that the Permittee has a potential to cause pollution of the waters of the state from leachate of solid waste.

This proposed permit requires, under the authority of RCW 90.48.080, that the Permittee update the solid waste plan designed to prevent solid waste from causing pollution of the waters of the state. The plan will include all solid wastes with the exception of those solid wastes regulated by Chapter 173-303 WAC (Dangerous Waste Regulations). The plan must be submitted to the local permitting agency for approval, if necessary, and to the Department.

TREATMENT SYSTEM OPERATING PLAN

In accordance with state and federal regulations, the Permittee is required to take all reasonable steps to properly operate and maintain the treatment system (40 CFR 122.41(e)) and WAC 173-220-150 (1)(g). An operation and maintenance manual was submitted as required by state regulation for the construction of wastewater treatment facilities (WAC 173-240-150). It has been determined that the implementation of the procedures in the Treatment System Operating Plan is a reasonable measure to ensure compliance with the terms and limitations in the permit.

GENERAL CONDITIONS

General Conditions are based directly on state and federal law and regulations and have been standardized for all individual industrial NPDES permits issued by the Department.

PERMIT ISSUANCE PROCEDURES

PERMIT MODIFICATIONS

The Department may modify this permit to impose numerical limitations, if necessary to meet Water Quality Standards for Surface Waters, Sediment Quality Standards, or Water Quality Standards for Ground Waters, based on new information obtained from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

The Department may also modify this permit as a result of new or amended state or federal regulations.

RECOMMENDATION FOR PERMIT ISSUANCE

This proposed permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to control toxics, protect human health, aquatic life, and the beneficial uses of waters of the State of Washington. The Department proposes that this proposed permit be issued for 5 years.

REFERENCES FOR TEXT AND APPENDICES

Duke Engineering, 1999. Pend Oreille Mine Discharge River Velocity Study, Duke Engineering & Services, Inc., January, 1999.

ENSR, 2003. Application for a Wastewater Discharge Permit for Discharge of Industrial Waste to Ground Water, Pend Oreille Mine Project, ENSR International. June, 2003.

EPA, 1992. National Toxics Rule. Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.

EPA, 1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001.

EPA, 1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington, D.C.

EPA, 1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water. EPA/600/6-85/002a.

EPA, 1983. Water Quality Standards Handbook. USEPA Office of Water, Washington, D.C.

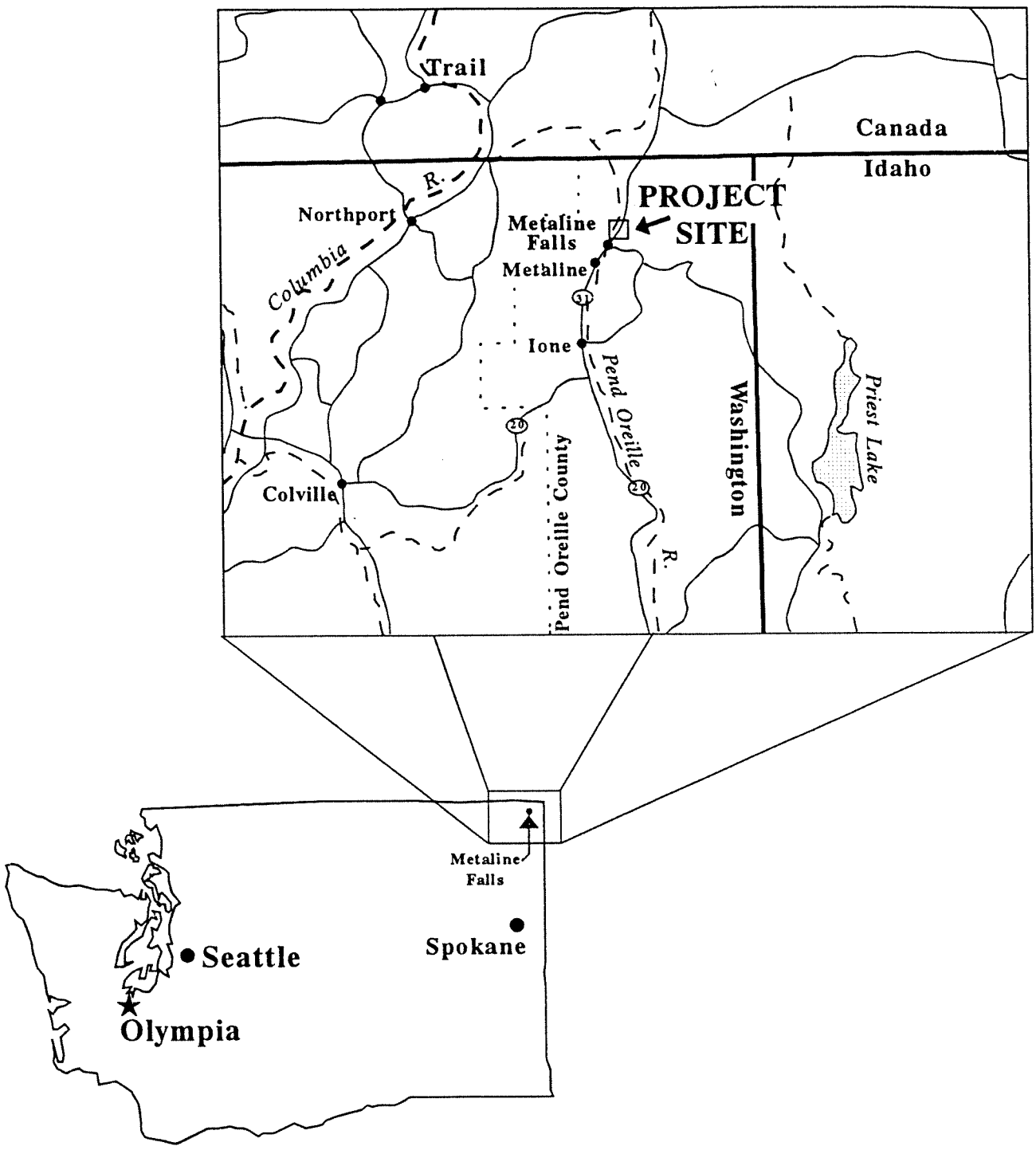
Ecology, 2000. Final Environmental Impact Statement, Pend Oreille Mine Project, Washington State Department of Ecology, July, 2000.

Ecology, 1997. Guidance for Conducting Mixing Zone Analyses, Washington State Department of Ecology, Publication #97-E12, January, 1997.

Ecology, 1994. Permit Writer's Manual. Publication Number 92-109.

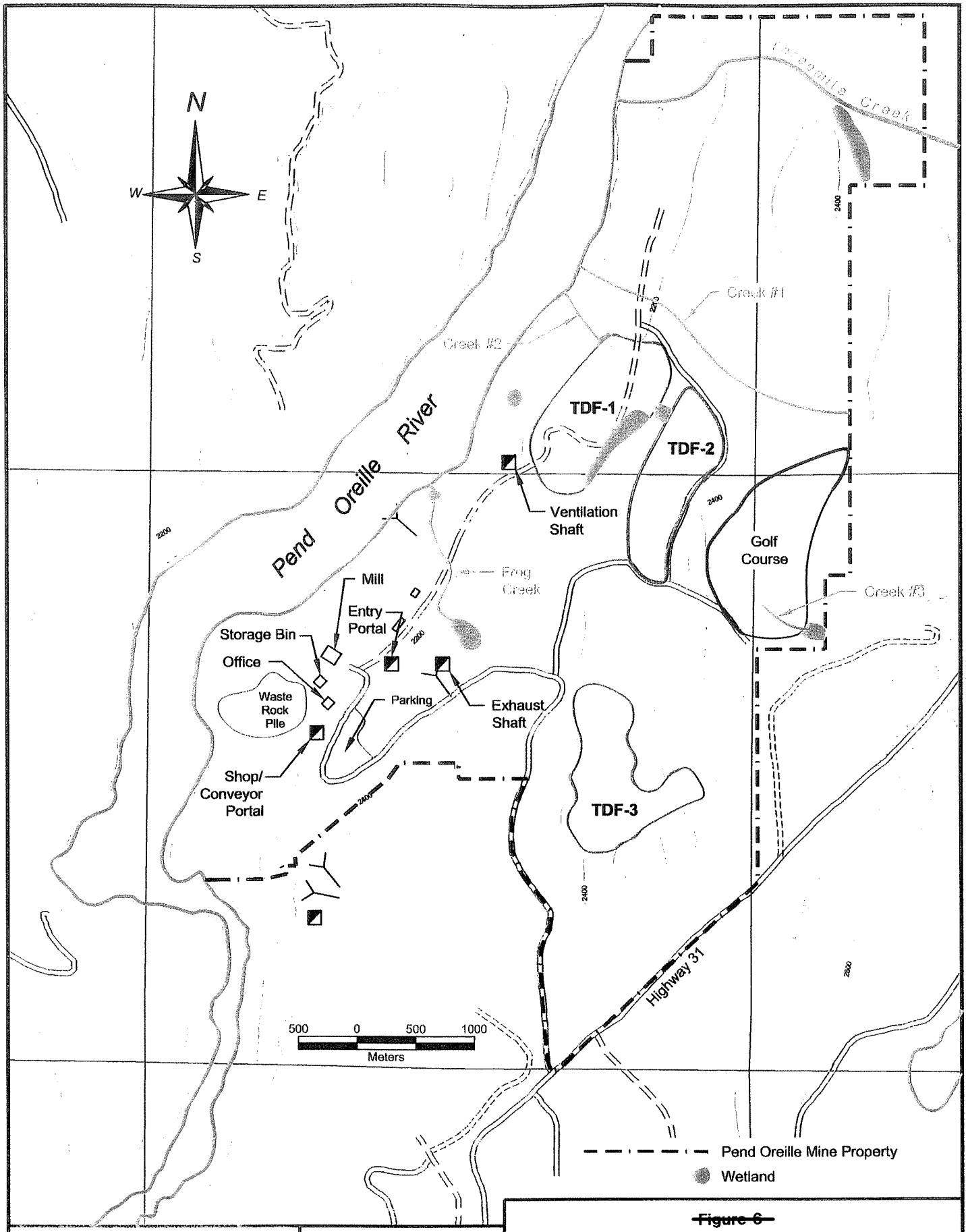
Ecology, 1987. Discharges Containing Oil and Grease of Mineral Origin, Washington State Department of Ecology, Water Quality Guideline #9, September, 1987.

RTG, 1993. National Pollutant Discharge Elimination System Permit Application and Supplementary Information, Pend Oreille Mine Reopening, Resource Technologies Group, Inc., November, 1993.



CLIENT	PROJECT	TITLE
RESOURCE FINANCE INC.	PEND OREILLE MINE	SITE LOCATION
Resource Technologies Group Inc.	PROJECT NO. 1226	DATE 10/22/92 ~~FIGURE 1~~

Figure 1 - Site Location (RTG, 1993)



ENSR INTERNATIONAL	DRAWN: K. Mongar / D. Norwood
	CHECKED: S. Paulus
	DATE: October 20, 1999
PROJECT NO: 8729-034-100	FILENAME: wt-s-s-c

~~Figure 6~~

WETLANDS, SPRINGS, SEEPS, AND CREEKS

Cominco American, Incorporated

Pend Oreille County, Washington

Figure 2 - Mill Site Map (ENSR, 2003)

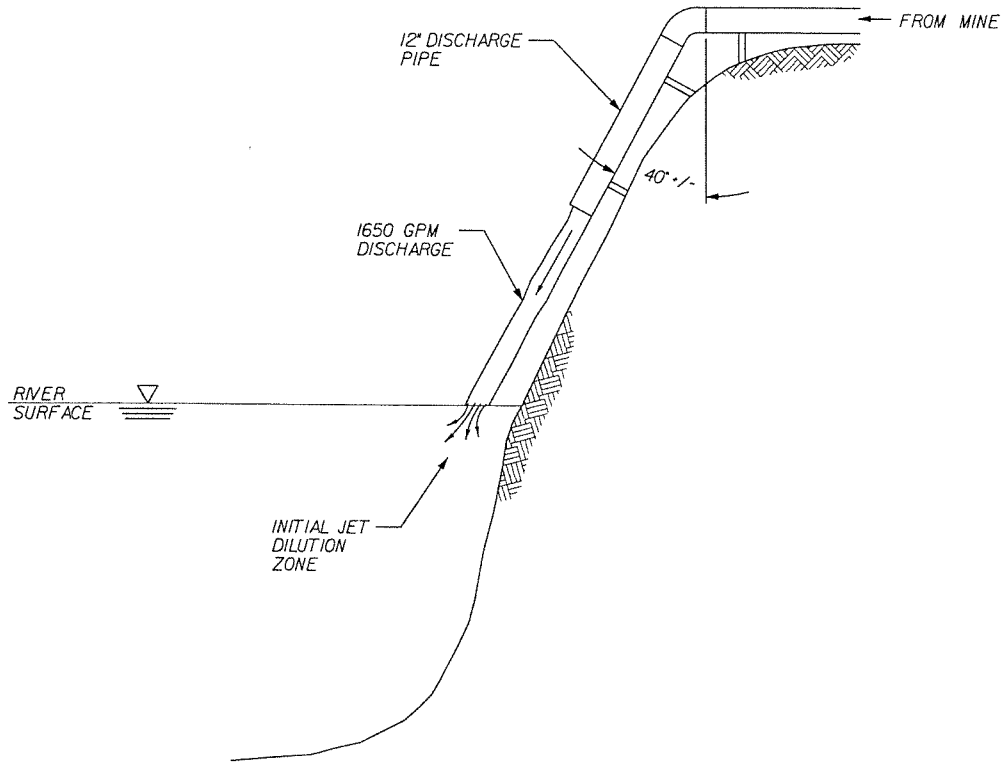


FIGURE 1.0-2
DISCHARGE SECTION

Figure 3 - Mine Water Discharge (Duke Engineering, 1999)

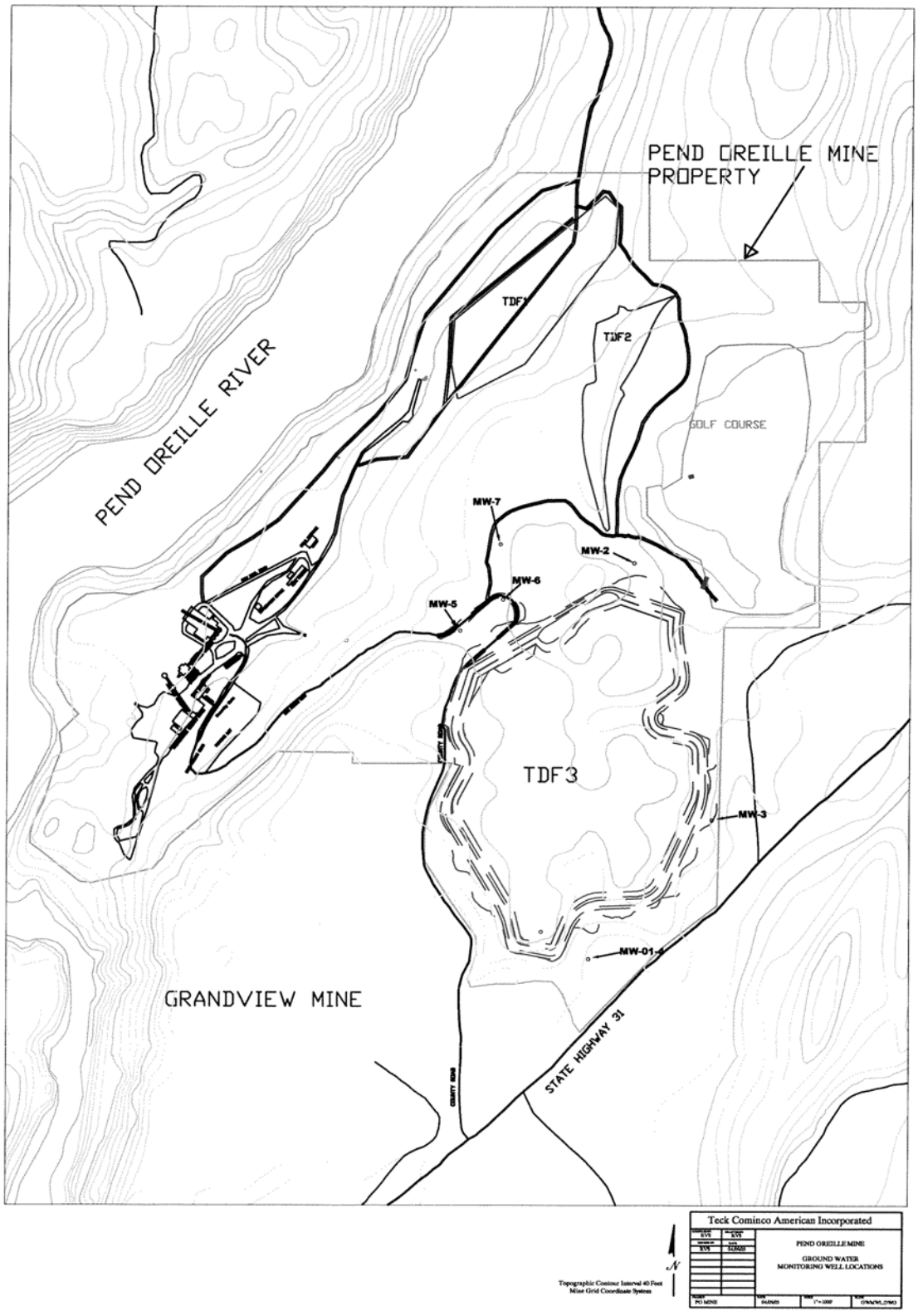


Figure 4 - Ground Water Monitoring Sites

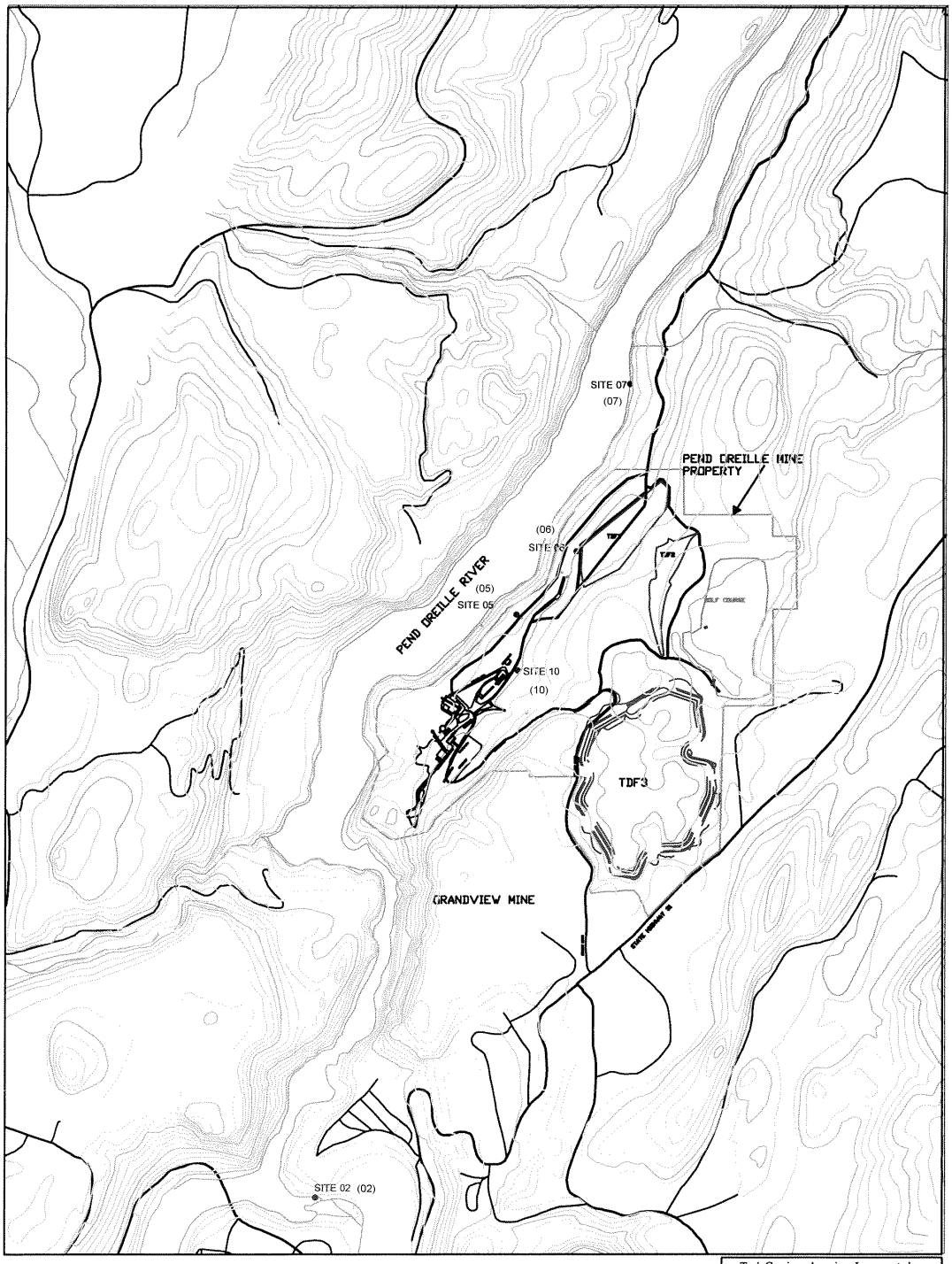


Figure 5 - Surface Water Monitoring Sites

Table 1 - Effluent Discharge Summary, 1/01 to 8/03, Teck Cominco

ROUTINE MONITORING				
Parameter	**Min**	**Max**	**Mean**	**#Samples**
Flow (mpd)	0.37	1.0	0.56	-
pH (s.u.)	6.51	8.91	8.01	138
Temperature (ºF)	58.1	72.7	66.9	137
Zinc, total (mg/L)	0.005	0.546	0.283	134
Lead, total (mg/L)	<0.005	0.366	0.047	134
Uranium (mg/L)	0.036	0.180	0.101	30
Radium (pCi/L)	22.4	56.2	43.28	30
Oil&Grease (mg/L)	<5	21	12.1	11
Cyanide (mg/L)	<0.01	0.013	0.012	12
Hardness (mg/L as $CaCO_3$)	244.5	371.0	290.2	23
Ammonia (mg/L as N)	<0.1	1.01	0.17	32
Nitrate (mg/L as N)	0.04	4.98	0.99	22
Sulfate (mg/L)	102	214	139	17
Cadmium, total (mg/L)	<0.002	<0.002	-	17
Copper, total (mg/L)	<0.003	0.009	0.005	17
Mecury, total (mg/L)	<0.0002	<0.0002	-	17
PERMIT APPLICATION DATA				
Parameter	**Min**	**Max**	**Mean**	**#Samples**
Arsenic, total (mg/L)	-	0.004	-	1
Nickel, total (mg/L)	-	0.006	-	1
Volitale, Semi-Volatile & Pesticides/PCBs	none detected			1

Table 2 - Receiving Water Conditions for Pend Oreille River, Teck Cominco

Parameter	Value Used	Source
7Q10 low flow	4,500 cfs (133.09 m^3/s)	Duke Engineering, 1999
Velocity	0.194 ft/s (0.059 m/s)	Duke Engineering, 1999
Depth at the Discharge	30 feet (9.14 m)	Duke Engineering, 1999
Width of River	690 feet (210.3 m)	Duke Engineering, 1999
Temperature	20 ºC	WQS[1]
pH (high)	8.5 s.u.	WQS[1]
Hardness	62.3 mg/L as CaCO3	Surface Water Monitoring[2]
Alkalinity	63 mg/L	Surface Water Monitoring[3]
Ammonia	0.10 mg/L	Surface Water Monitoring[2]
Radium	0.03 pCi/L	Surface Water Monitoring[2]
Uranium	21.4 µg/L	Surface Water Monitoring[2]
Zinc, dissolved	11 µg/L	Surface Water Monitoring[2]
Copper, dissolved	7 µg/L	Surface Water Monitoring[2]
All other metals	0 (below detection limits)	Surface Water Monitoring[2]

[1]Upper limit of Water Quality Criteria

[2]Data from station 02 -- Pend Oreille River @ Flume Creek, from 4/98 to 7/03. Hardness is lowest value in data set. Ammonia, zinc, and copper are highest values in data set. Radium and uranium and mean values of data set.

[3]Data from station 02 -- Pend Oreille River @ Flume Creek, from 11/92 to 11/93, lowest value of 11 data points.

Table 3 - Comparison of Technology Based Limits versus Water Quality Based Limits, Teck Cominco

	Technology Based Limits[a]		Water Quality Based Limits[b]	
Metal	**Daily Maximum**	**Monthly Average**	**Daily Maximum**	**Monthly Average**
Copper, µg/L	300	150	78	54
Zinc, µg/L	1,500	750	890	444
Lead, µg/L	600	300	567	283
Mercury, µg/L	2	1	2.05	1.41
Cadmium, µg/L	100	50	32.2	22.1
[a]Total Metals				
[b]Total Recoverable Metals				

Table 4 - Effluent Temperature Data, 1/01 to 8/03, Teck Cominco

Date	Temp (°F)
01/02/01	66
01/09/01	66
01/16/01	66
01/23/01	67
01/30/01	65
02/06/01	66
02/13/01	66
02/20/01	66
02/27/01	66
03/06/01	65
03/13/01	66
03/20/01	66
03/28/01	67
04/03/01	66
04/09/01	66
04/17/01	66
04/24/01	65
05/08/01	67
05/15/01	65
05/22/01	65
05/29/01	65
06/05/01	67
06/12/01	67
06/19/01	66
06/25/01	67
07/03/01	66.74
07/10/01	68.36
07/17/01	69.08
07/24/01	67.46
07/31/01	65.3
08/07/01	67.1
08/14/01	66.92
08/21/01	68.54
08/28/01	67.46
09/04/01	68.54
09/11/01	66.92
09/19/01	67.28
09/25/01	66.2
10/02/01	67.46
10/09/01	64.04
10/16/01	69.08
10/23/01	68.18
10/30/01	68.18
11/06/01	69.8
11/13/01	66.2
11/20/01	69.08
11/27/01	68.36
12/04/01	66.74
12/11/01	66.56

Date	Temp (°F)
12/18/01	67.28
12/26/01	65.3
01/02/02	65.48
01/08/02	66.92
01/22/02	72.68
01/29/02	65.48
02/05/02	65.48
02/12/02	65.66
02/19/02	67.28
02/26/02	66.02
03/05/02	66.38
03/12/02	67.28
03/19/02	66.74
03/26/02	66.92
04/02/02	64.04
04/09/02	67.82
04/16/02	68.9
04/23/02	67.28
04/30/02	69.08
05/07/02	68.72
05/14/02	69.62
05/21/02	69.8
05/28/02	69.98
06/04/02	69.44
06/11/02	69.62
06/18/02	69.26
06/25/02	70.16
07/02/02	70.16
07/09/02	69.44
07/16/02	69.44
07/23/02	70.16
07/30/02	70.88
08/06/02	69.62
08/13/02	70.16
08/20/02	69.26
08/27/02	69.08
09/03/02	69.08
09/10/02	69.08
09/17/02	70.16
09/24/02	68
10/01/02	69.44
10/08/02	68.54
10/15/02	66.92
10/22/02	68.18
10/29/02	66.92
11/05/02	65.48
11/12/02	66.92
11/19/02	66.02
11/26/02	67.64

Date	Temp (°F)
12/03/02	67.1
12/10/02	67.64
12/17/02	68
12/23/02	67.1
12/31/02	66.74
01/07/03	65.3
01/13/03	65.12
01/20/03	65.84
01/27/03	66.2
02/03/03	66.56
02/10/03	65.66
02/18/03	67.28
02/24/03	64.94
03/03/03	67.1
03/10/03	67.1
03/17/03	67.28
03/24/03	66.02
03/31/03	66.38
04/07/03	67.1
04/14/03	67.28
04/21/03	64.04
04/28/03	61.88
06/10/03	67.82
06/17/03	67.1
06/24/03	64.4
07/01/03	66.56
07/08/03	66.74
07/15/03	67.28
07/22/03	68.18
07/29/03	68
08/05/03	68.54
08/12/03	68
08/19/03	67.1
08/26/03	66.56

Mean	67.22
Standard Error	0.15
Median	67.05
Mode	66.00
Standard Deviation	1.67
Sample Variance	2.80
Kurtosis	0.44
Skewness	0.21
Range	10.80
Minimum	61.88
Maximum	72.68
Sum	8872.72
Count	132

Monthly Average Limit = mean + 2 standard deviations = 67.22 + 2 * 1.67 = 70.6 ºF

Daily Maximum Limit = mean + 3 standard deviations = 67.22 + 3 * 1.67 = 72.2 ºF

APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

The Department has tentatively determined to reissue a permit to the applicant listed on page 1 of this fact sheet. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

Public notice of application was published on July 30 and August 6, 2003 in the Newport News Miner to inform the public that an application had been submitted and to invite comment on the reissuance of this permit.

The Department will publish a Public Notice of Draft (PNOD) on November 5, 2003 in the Colville Statesman Examiner and the Newport News Miner and November 10, 2003 in the Selkirk Sun to inform the public that a draft permit and fact sheet are available for review. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments should be mailed to:

Water Quality Permit Coordinator
Department of Ecology
Eastern Regional Office
4601 North Monroe Street
Spokane, WA 99205-1295

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the thirty (30) day comment period to the address above. The request for a hearing shall indicate the interest of the party and reasons why the hearing is warranted. The Department will hold a hearing if it determines there is a significant public interest in the draft permit (WAC 173-220-090). Public notice regarding any hearing will be circulated at least thirty (30) days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing (WAC 173-220-100).

Comments should reference specific text followed by proposed modification or concern when possible. Comments may address technical issues, accuracy and completeness of information, the scope of the facility's proposed coverage, adequacy of environmental protection, permit conditions, or any other concern that would result from issuance of this permit.

The Department will consider all comments received within thirty (30) days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from the Department by telephone, (509) 329-3400, or by writing to the address listed above.

APPENDIX B--GLOSSARY

Acute Toxicity--The lethal effect of a compound on an organism that occurs in a short period of time, usually 48 to 96 hours.

AKART-- An acronym for "all known, available, and reasonable methods of treatment".

Ambient Water Quality--The existing environmental condition of the water in a receiving water body.

Ammonia--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Average Monthly Discharge Limitation --The average of the measured values obtained over a calendar month's time.

Best Management Practices (BMPs)--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD_5--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass--The intentional diversion of waste streams from any portion of a treatment facility.

Chlorine--Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic Toxicity--The effect of a compound on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Clean Water Act (CWA)--The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Compliance Inspection - Without Sampling--A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance Inspection - With Sampling--A site visit to accomplish the purpose of a Compliance Inspection - Without Sampling and as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. Additional sampling may be conducted.

Composite Sample--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite"(collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots.

Construction Activity--Clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

Continuous Monitoring –Uninterrupted, unless otherwise noted in the permit.

Critical Condition--The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Dilution Factor--A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the percent effluent fraction e.g., a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

Engineering Report--A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal Coliform Bacteria--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab Sample--A single sample or measurement taken at a specific time or over as short period of time as is feasible.

Industrial Wastewater--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Major Facility--A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Maximum Daily Discharge Limitation--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Method Detection Level (MDL)--The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is above zero and is determined from analysis of a sample in a given matrix containing the analyte.

Minor Facility--A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Mixing Zone--An area that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in state regulations (Chapter 173-201A WAC).

National Pollutant Discharge Elimination System (NPDES)--The NPDES (Section 402 of the Clean Water Act) is the Federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the State of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both State and Federal laws.

pH--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Quantitation Level (QL)-- A calculated value five times the MDL (method detection level).

Responsible Corporate Officer-- A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or have gross annual sales or expenditures exceeding $25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures (40 CFR 122.22).

Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Suspended Solids (TSS)--Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

State Waters--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

Upset--An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water Quality-based Effluent Limit--A limit on the concentration of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving water.

APPENDIX C--TECHNICAL CALCULATIONS

Several of the Excel® spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found on the Department's homepage at http://www.ecy.wa.gov.

Effluent and Receiving Water Critical Conditions

Facility: **Teck Cominco**
Receiving Water: **Pend Oreille River**

Design Case: **Proposed Permit**

CLICK HERE FOR INSTRUCTIONS	Effluent Data: Annual Average Flow	Effluent Data: Monthly Average Flow	Effluent Data: Daily Maximum Flow	Receiving Water Data: 7Q10 Critical Flow	Receiving Water Data: 30Q5 Critical Flow	Receiving Water Data: Harmonic Mean Flow	%flow for dilution
Flow (MGD)	**1.44**	**1.44**	**1.92**	2908.35	4071.69	8725.05	**25**
(cfs)	2.23	2.23	2.97	**4500.00**			
Max Temp (°C)	**22.60**			**20.00**			
(°F)	72.7			68.0			
Min Hardness (mg/L CaCO3)	**244.50**	Effluent Data ←		**62.30**	Receiving Water Data ←		
Max pH (s.u.)	**8.91**			**8.50**			
Max Alkalinity (mg/L as CaCO3)	**150.00**			**63.00**			

Enter own pH & Temp for Ammonia Criteria?	**n**		Enter own Dilution Factors (DFs)?	**y**	
	pH	Temp (°C)	Acute DF	**10.50**	
@ Acute Boundary			Chronic DF	**104.20**	
@ Chronic Boundary			Human Health (non C) DF	**104.20**	
			Human Health (Carcn) DF	**104.20**	

	@ Acute Boundary	@ Chronic Boundary	Whole River Dilution (@ 7Q10 Flow)	@ 30Q5 River Flow (non C)	@Harmonic Mean River Flow (Carcn)
Dilution Factor	10.50	104.20	2020.69	104.20	104.20
(% effluent)	9.52	0.96	0.05	0.96	0.96
Hardness	79.65	64.05	62.39	-	-
Alkalinity	71.29	63.83	63.04	-	-
Max pH (s.u.)	8.56	8.51	8.50	-	-
Max Temp (°C)	20.25	20.02	20.00	-	-
Max Temp (°F)	68.45	68.04	68.00	-	-

Run Date: 10/1/2003

Pollutant, Effluent, and Receiving Water Data

Facility: Teck Cominco
Receiving Water: Pend Oreille River
Design Case: Proposed Permit

Pollutant, CAS No. & Application Ref. No.	priority pollutant?	standard	Freshwater Quality Criteria acute *ug/L*	Freshwater Quality Criteria chronic *ug/L*	Metals Translators acute	Metals Translators chronic	Probability (0.95 - WQ Based; 0.5 - Human Health)	Enter Effluent Data: max effleunt concentration (measured) *ug/L*	Enter Effluent Data: # of data points	Enter Effluent Data: Coefficient of Varation	Enter Effluent Data: #samples per month for compliance monitoring	Enter Effluent Data: 50% percentile effluent conc for HH RPD, when n>10 (leave blank otherwise) *ug/L*	Enter RW Data: Ambient Concentration *ug/L*
AMMONIA unionized	N	WQ Stnd	1680.7	304.8	0.0	0.0	0.95	1010.0	32	0.6	1		100.00
ARSENIC (dissolved) 7440382 2M	Y	WQ Stnd	360.0	190.0	1.0	1.0	0.95	4.0	1	0.6	1		
ARSENIC (inorganic)	Y	HH-Carcn	HH	0.018	0.0	0.0	0.5	4.0	1	0.6	1		
CYANIDE 57125 14M	Y	WQ Stnd	22.0	5.2	0.0	0.0	0.95	13.0	12	0.6	1		
CYANIDE 57125 14M	Y	HH-Non C	HH	700.0	0.0	0.0	0.5	13.0	12	0.6	1		
MERCURY 7439976 8M	Y	HH-Non C	HH	0.14	0.0	0.0	0.5	0.2	17	0.6	1		
NICKEL** - 7440020 9M	Y	WQ Stnd	1167.6	107.8	0.998	0.997	0.95	6.0	1	0.6	1		
NICKEL - 7440020 9M	Y	HH-Non C	HH	610.0	0.0	0.0	0.5	6.0	1	0.6	1		
RADIUM 226 & 228 (note: units are in pCi/L)	N	HH-Carcn	HH	5.0	0.0	0.0	0.5				1	43.3	0.03
URANIUM (note units are in ug/L)	N	HH-Carcn	HH	30.0	0.0	0.0	0.5				1	101.0	21.40

** - Criteria dependent on hardness

Run Date: 10/1/2003

Summary of Effluent Reasonable Potential Determination & Limits

Facility: Teck Cominco
Receiving Water: Pend Oreille River
Design Case: Proposed Permit

POLLUTANT	priority pollutant?	standard	Maximum Expected (or 50%) Effluent Concentration, µg/L	Does reasonable potential exist?	Receiving Water: Upstream RW Conc, µg/L	Acute Boundary: RW Acute Criteria, µg/L	Acute Boundary: Conc @ Acute MZ Boundary, µg/L	Chronic Boundary: RW Chronic (or Human Health) Criteria, µg/L	Chronic Boundary: Conc @ Chronic (or Human Health) MZ Boundary, µg/L	Permit Limits: Daily Maximum Limit, µg/L	Permit Limits: Monthly Average Limit, µg/L
AMMONIA unionized	N	WQ Stnd	1192.9	NO	100.0	1680.7	204.1	304.8	110.5		
ARSENIC (dissolved) 7440382 2M	Y	WQ Stnd	24.8	NO	0.0	360.0	2.361	190.0	0.238		
ARSENIC (inorganic)	Y	HH-Carcn	9.958	YES	0.0	HH		0.018	0.096	2.736	1.876
CYANIDE 57125 14M	Y	WQ Stnd	21.1	NO	0.0	22.0	2.012	5.2	0.203		
CYANIDE 57125 14M	Y	HH-Non C	8.487	NO	0.0	HH		700.0	0.081		
MERCURY 7439976 8M	Y	HH-Non C	0.116	NO	0.0	HH		0.14	0.00111		
NICKEL** - 7440020 9M	Y	WQ Stnd	37.2	NO	0.0	1167.6	3.534	107.8	0.356		
NICKEL - 7440020 9M	Y	HH-Non C	14.9	NO	0.0	HH		610.0	0.143		
RADIUM 226 & 228 (note: units are in pCi/L)	N	HH-Carcn	43.3	NO	0.03	HH		5.0	0.445		
URANIUM (note units are in ug/L)	N	HH-Carcn	101.0	NO	21.4	HH		30.0	22.2		

** - Criteria dependent on hardness

Effluent and Receiving Water Critical Conditions

Facility: **Teck Cominco**
Receiving Water: **Pend Oreille River**

Design Case: **WQ Based Limits**

CLICK HERE FOR INSTRUCTIONS	Effluent Data: Annual Average Flow	Effluent Data: Monthly Average Flow	Effluent Data: Daily Maximum Flow	Receiving Water Data: 7Q10 Critical Flow	Receiving Water Data: 30Q5 Critical Flow	Receiving Water Data: Harmonic Mean Flow	%flow for dilution
Flow (MGD)	**1.44**	**1.44**	**1.92**	2908.35	4071.69	8725.05	**25**
(cfs)	2.23	2.23	2.97	**4500.00**			
Max Temp (°C)	**22.60**			**20.00**			
(°F)	72.7			68.0			
Min Hardness (mg/L CaCO3)	**244.50**	Effluent Data ←		**62.30**	Receiving Water Data ←		
Max pH (s.u.)	**8.91**			**8.50**			
Max Alkalinity (mg/L as CaCO3)	**150.00**			**63.00**			

Enter own pH & Temp for Ammonia Criteria?	**n**		Enter own Dilution Factors (DFs)?	**y**
	pH	Temp (°C)	Acute DF	**10.50**
@ Acute Boundary			Chronic DF	**104.20**
@ Chronic Boundary			Human Health (non C) DF	**104.20**
			Human Health (Carcn) DF	**104.20**

	@ Acute Boundary	@ Chronic Boundary	Whole River Dilution (@ 7Q10 Flow)	@ 30Q5 River Flow (non C)	@Harmonic Mean River Flow (Carcn)
Dilution Factor	10.50	104.20	2020.69	104.20	104.20
(% effluent)	9.52	0.96	0.05	0.96	0.96
Hardness	79.65	64.05	62.39	-	-
Alkalinity	71.29	63.83	63.04	-	-
Max pH (s.u.)	8.56	8.51	8.50	-	-
Max Temp (°C)	20.25	20.02	20.00	-	-
Max Temp (°F)	68.45	68.04	68.00	-	-

Run Date: 10/1/2003

Pollutant, Effluent, and Receiving Water Data

Facility: Teck Cominco
Receiving Water: Pend Oreille River
Design Case: WQ Based Limits

Pollutant, CAS No. & Application Ref. No.	priority pollutant?	standard	Freshwater Quality Criteria acute ug/L	Freshwater Quality Criteria chronic ug/L	Metals Translators acute	Metals Translators chronic	Probability (0.95 - WQ Based; 0.5 - Human Health)	Enter Effluent Data: max effleunt concentration (measured) ug/L	# of data points	Coefficient of Varation	#samples per month for compliance monitoring	50% percentile effluent conc for HH RPD, when n>10 (leave blank otherwise) ug/L	Enter RW Data: Ambient Concentration ug/L
CADMIUM** - 7440439 4M	Y	WQ Stnd	2.893	0.742	0.943	0.943	0.95	100.0	58	0.6	1		
COPPER** - 744058 6M	Y	WQ Stnd	13.7	7.757	0.996	0.996	0.95	300.0	58	0.6	1		7.00
LEAD** - 7439921 7M	Y	WQ Stnd	50.4	1.544	0.466	0.466	0.95	600.0	58	0.6	4		
MERCURY 7439976 8M	Y	WQ Stnd	2.1	0.012	0.85	0.0	0.95	2.0	58	0.6	1		
ZINC**- 7440666 13M	Y	WQ Stnd	94.4	71.6	0.996	0.996	0.95	1500.0	58	0.6	4		11.00

** - Criteria dependent on hardness

Run Date: 10/1/2003

Summary of Effluent Reasonable Potential Determination & Limits

Facility: Teck Cominco
Receiving Water: Pend Oreille River
Design Case: WQ Based Limits

POLLUTANT	priority pollutant?	standard	Maximum Expected (or 50%) Effluent Concentration, µg/L	Does reasonable potential exist?	Receiving Water: Upstream RW Conc, µg/L	Acute Boundary: RW Acute Criteria, µg/L	Acute Boundary: Conc @ Acute MZ Boundary, µg/L	Chronic Boundary: RW Chronic (or Human Health) Criteria, µg/L	Chronic Boundary: Conc @ Chronic (or Human Health) MZ Boundary, µg/L	Permit Limits: Daily Maximum Limit, µg/L	Permit Limits: Monthly Average Limit, µg/L
CADMIUM** - 7440439 4M	Y	WQ Stnd	100.2	YES	0.0	2.893	8.997	0.742	0.907	32.2	22.1
COPPER** - 744058 6M	Y	WQ Stnd	300.5	YES	7.0	13.7	34.8	7.757	9.806	78.0	53.5
LEAD** - 7439921 7M	Y	WQ Stnd	601.1	YES	0.0	50.4	26.7	1.544	2.688	567.3	282.8
MERCURY 7439976 8M	Y	WQ Stnd	2.004	YES	0.0	2.1	0.162	0.012	0.019	2.054	1.408
ZINC**- 7440666 13M	Y	WQ Stnd	1502.7	YES	11.0	94.4	152.5	71.6	25.3	890.1	443.7

** - Criteria dependent on hardness

APPENDIX D--RESPONSE TO COMMENTS